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December 22, 1998

Assistant Commissioner for Patents  
Washington, D.C. 20231

Attention: Box PCT - DESIGNATED/ELECTED OFFICE (DO/EO/US)

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FORM PTO-1390 (REV 5-93)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER SIMNS 4355.01	
<b>TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371</b>					
INTERNATIONAL APPLICATION NO. PCT/EP97/02167		INTERNATIONAL FILING DATE April 26, 1997		U.S. APPLICATION NO. (If known, see 37 CFR 1.5) <b>09/202759</b>	
				PRIORITY DATE CLAIMED June 22, 1996	
TITLE OF INVENTION - see attached pages -					
APPLICANT(S) FOR DO/EO/US - see attached pages -					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:  1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(I).					

- See attached pages for additional data -



December 22, 1998

Assistant Commissioner for Patents  
Washington, D.C. 20231

Attorney Docket: SIMNS 4355.01

Attention: PCT-DO/US

Re: INTERNATIONAL APPLICATION PCT/EP97/02167 filed April 26, 1997  
Priority Claimed: Germany 196 24 977.5 of June 22, 1996

Inventors: Karl-Günther HÄNSEL and Walter ROSENBAUM

Title: Method of Processing Postal Matters

Submitted herewith, as the first submission, are the following for the purposes of entering the national stage for the USA under 35 U.S.C. 371(c), immediate national examination under 35 U.S.C. 371(f) being requested.

- International Application PCT/EP97/02668 published as WO 97/49502, with English-language international search report issued by the European Patent Office.
- Filing fee of \$840.00

Should no remittance be attached, or should a greater or lesser fee be required, please charge or credit our Account No. 19-3700.

NOTE: The inventor declaration and translation will follow.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "G. Spencer", written over a horizontal line.

George H. Spencer  
Registration No. 18,038

GHS:jc

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re PATENT APPLICATION of

Applicant	:	Karl-Günther HÄNSEL, et al	)	
Application No.	:	PCT/DE97/02167	)	
Filed	:	April 26, 1997	)	
National Stage No.:		09/202,759	)	PRELIMINARY
National filing date:		December 22, 1998	)	AMENDMENT
For	:	METHOD OF PROCESSING POSTAL MATTERS	)	
Attorney Docket	:	32221-143591 NNK	)	
			)	February 28, 2000

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to examination, please amend this application as follows:

IN THE CLAIMS

Claim 3, line 1, delete "or 2".

Claim 7 line1, delete "according to one of claims 1-6", and insert -- claim 1--.

Claim 9, line 1, delete "to 8".

Claim 10, line 1, delete "to 9".

Claim 11, line 1, delete "to 9".

Claim 12, line 1, delete "to 11".

Claim 13, line 1, delete "to 12".

REMARKS

The above amendments to the claims have been made to avoid the use of multiple dependent claims.

Respectfully submitted,



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Method of Processing Postal Goods

Description

5           The invention relates to a method according to the preamble to the independent patent claims. In the most far-reaching sense, the invention relates to the field of automatic letter processing and in particular to systems, for which an automatic address reading method is supplemented and improved by the use of video coding during the address interpretation.

10           Automatic address reading systems (OCR) are well known in the field of letter processing and are described, for example, in the DE 195 31 392. Modern OCR letter sorting systems can achieve letter processing rates of 10 letters per second, meaning 36,000 letters per hour and more. However, the recognition reliability varies considerably, depending on the lettering style and total quality of the address information  
15           affixed to the letter surface. In case of a successful recognition, the respective letter can be provided with a machine-readable bar code. This bar code permits a further mechanical processing up to a desired, optional sorting order. In particular, the use of bar codes permits a sorting of letters up to the sorting level of the postal run, for which the letters are sorted according to the distribution sequence used by the delivery person.

20           Owing to the fact that the recognition rates for automatic reading systems vary considerably, it is necessary to support these through various forms of manual

intervention. The simplest intervention is that of rejecting letters not readable in automatic reading systems and using a hand-sorting process. However, the resulting expenses are uneconomically high, given the increasing operational expenses. Added to this is the fact that a mechanical sorting of such postal goods is not possible without

problems at a later point in time, so that two separate flows of goods are created, which must then be combined again manually at a specific point in time.

In order to avoid these disadvantages resulting from the manual sorting of OCR rejected goods, various methods have been developed for a manual coding of postal  
5 goods. All these methods use operator intervention to affix bar codes to the goods in a manner that is consistent with the requirement to carry out a mechanical sorting with the same machines that process OCR-read and bar-coded mail.

Another method for coding rejected postal goods uses so-called manual coding stations. At these manually operated coding stations, the goods are physically presented  
10 one after another to an operator, wherein the operator encodes enough information for each of these goods, as is necessary to clearly identify the destination. For this, the input address is converted by means of a directory to a sorting bar code, which is then affixed to the item. The coded goods are subsequently processed further by means of bar code sorters (BCS), which are identical to OCR-suitable BCS. Manually operated coding  
15 stations of this type were first introduced by the US Post Office and the Royal Mail during the 1970's. The main disadvantages of systems of this type are the necessity to remove goods from the OCR flow of goods and the ergonomic difficulties experienced by the operator when identifying goods transported past the operator.

The next progressive step in the treatment of OCR-rejected goods was the  
20 development of on-line video coding systems (OVS). In an OVS, a video image of the item is presented to the operator for coding in place of the physical item at the manual coding stations. The video image is shown to the operator while the physical goods are

held in delay loops. In these delay loops, the goods are normally held in motion for an interval that is sufficient for the OVS operator to input the necessary sorting information for the respective image. The standard delay loops permit delays of between 10 and 30 seconds. The longer the delay loop, the higher the costs as well as the requirements for  
5 maintenance and the physical size of the facility.

The main problem when using OVS is that the available time is only sufficient for a careful input of the zip code (ZIP) or the postal code (PC), unless delay loops with an impractical length are used.

For that reason, special coding methods were developed to keep the on-line delay  
10 time as low as possible.

In order to increase the coding productivity and/or permit the listing of all address elements, meaning the zip code/postal code, street/post office box, addressee/post office box, addressee/firm, various method have been developed in prior art. Essentially, these include:

15 Preview Coding

The preview coding involves a simultaneous display of images from two goods, one above the other. In this case, the lower image is the active one, meaning its data are encoded. Following a suitable training, the operators can encode the information on the lower image while at the same time recording the address information from the upper  
20



image. The upper image subsequently becomes active and the process is continued. The preview coding permits a doubling of the operator productivity through a complete overlapping of the cognitive and the motorized functions during the coding of successive images.

5

#### Extraction Coding

Since only the zip/pc address elements can be input reliably by the operator, given the on-line delay times that are possible in practical operations, specific key components of the address components referring to the street are input during the extraction coding.

- 10 The extraction coding normally is based on specially developed rules, for which a code window length is used as access key to an address directory. For example, the Royal Mail uses an extraction formula that is based on the first three and the last two letters. In that case, the operator must memorize special rules to avoid superfluous address information and must take into account specific, differentiating characteristics, e.g.
- 15 directions such as east, west or categories such as street, lane, road.

- Despite a certain effectiveness, the extraction coding has several considerable disadvantages. In particular, it has complex extraction rules, which frequently require taking into account the end of a street name while these components normally are written with the least amount of clarity. They also involve a significantly high rate of extractions
- 20 that are not clear and for which several entries in a directory correspond to the extraction code, so that a clear sorting decision cannot be made. Furthermore, it must be taken into account that the input productivity of the operators is reduced as soon as the operator must make decisions instead of performing a simple, repetitive keyboard entry.

Completion Coding

In contrast to the extraction coding, a variable input is made for the completion coding for each address to be encoded. During the input, the address is essentially aligned with the address directory, until these clearly coincide. An acceleration effect is  
5 achieved by displaying the remainder of the address as soon as it is recognized that these

clearly coincide in part. However, with this technology problems occur in that an input stop signal must be transmitted to the operator and an illustration of the identified remainder of the address is necessary, which leads to a reduced input productivity and prevents a preview coding.

5

#### Operator-Assisted OCR Technology

The US Postal Service has experimented with operator-assisted OCR techniques to increase the address information to be processed on line. In this case, the portion of the address image, for which the OCR identification has failed, is emphasized to increase the effectiveness. Since the operators are slow when deciphering missing letters and since in part complex identification errors, e.g. segmenting problems, occur as well, the operator productivity with this method is frequently lower than with a simple re-entering of the respective address.

#### 15 Off-line Coding

Since a sufficiently high productivity for on-line coding cannot be achieved with any of the above-mentioned coding techniques, an off-line coding system was recently introduced, e.g. as described in the US PS 49 92 649. With this system, goods with unidentified addresses are provided with an additional information, a tracking identification (TID). The unidentified goods are stored externally while the images of these goods are presented to operators for coding, wherein no time limits exist for this. The goods are subsequently presented to TID readers. The TID is linked to the entered

address information. Based on this, a standard bar code sorting information can also be affixed to the item, so that the respective item can be processed in the same way as goods that are normally OCR-read. Even though the off-line video coding method is an effective method for coding all address components, the further processing of goods with  
5 addresses that have not been read requires additional capacities and a correspondingly complex logistic.

European Patent A-589119 discloses a method for finding address blocks in the images of the mail item surfaces. If these have not been unambiguously localized during the automatic search, the images are subsequently transmitted to a video coding station.  
10 In the process, the operator marks this area, which is then stored. Following this, the automatic address block search is provided this information, so that the address blocks for additional goods of the same type from large volume customers can be found automatically. This method relates to a preliminary stage before the address interpretation.

15 It is the object of the present invention, to successfully read the addresses of mail items within the shortest possible time in an address reading system with OCR unit and video-coding unit.

The invention permits an improved integration of automatic reading systems and video coding. The invention furthermore permits the effective use of an extraction  
20 coding in integrated, automatic and video coding systems; in particular, it permits a simplification of the decision problem for the operator during the address coding. Another advantage of the method according to the invention is that additional sorting information can be evaluated effectively, e.g. information referring to the name line in the

address. The invention has the added advantage of making it possible to deal effectively with inconsistencies, which can result, for example, from the extraction coding or inscription errors made by the sender. The method also permits a simple integration of on-line and off-line coding, as well as the preview coding method.

Advantageous embodiments of the invention follow from the dependent claims and the description.

The invention is illustrated in the following with the aid of exemplary embodiments and drawings. In detail, these show:

- 5    Figure 1                    A schematic representation of a device for carrying out the method;
- Figures 2 and 3        An overview of the data flow according to the invention.

Figure 1 shows a schematic representation of a letter distribution facility for  
10    implementing the method according to the invention. The OCR letter sorter 100  
     comprises a feeding device 110, which pulls successive goods from a magazine 111 and  
     transports these at approximately 10 goods per second to a high-resolution video scanner  
     120. Following this, the goods are transported along a delay loop 121. The goods  
     normally have address information on their surfaces. The OCR processor 130 is used for  
15    an evaluation of the address information on the images for the goods, obtained with the  
     video scanner 120. If the evaluation is completed, a bar code printer 150 is actuated and  
     the item is provided with a corresponding bar code for the subsequent sorting into sorting  
     compartments 160. The OCR processor 130 comprises one or several microprocessors  
     131 with associated memory 132 for storing the images of the goods. The OCR  
20    processor furthermore comprises an address directory 134 with zip codes, city names and  
     street names and possibly additional address-related information. During the evaluation  
     of the images containing address information, a reduction, controlled by characteristics,

of the entry obtained through the address directory occurs, such that a sort of partial dictionary is created. Reliability factors are associated during the individual entries, so that during the evaluation a number of data from correctly identified addresses are generated. The device furthermore contains an image controller 170, as well as a number  
5 of video coding stations 200, which are connected directly to the image controller 170 or

via a local area network (LAN) 171. If the OCR evaluation of an image is not or not completely successful, this image is transferred from the OCR processor 130 to the image controller 170, which controls on the one hand the TID bar code printer 151 and, on the other hand, sends the corresponding image to one of the video coding stations 200. The

5 TID bar code printer 151 affixes an identification code TID to the corresponding item, which makes it possible to link the evaluated address information at a later time to a physical item. In that case, the images are preferably evaluated off-line, even though an on-line evaluation through video coding is basically possible, given a sufficiently long delay time. In the latter case, the TID can also be affixed to the goods at a later point in

10 time, meaning if the video coding did not result in a complete evaluation within a predetermined, specific time interval.

In order to implement another and better illustrated method, the image controller 170 is designed such that address information, which is not completely evaluated by the video coding, is supplied to another automatic address evaluation device, using the results

15 from the video coding in the OCR processor.

The Figures 2 and 3 show data-flow diagrams. The operators preferably work with divided displays 210, of which the upper one permits a preview and the lower one is normally the active one. Data input by the operator are shown in the prompt line 211. Images of goods that were not completely evaluated automatically are transmitted to the

20 video coding 220. The example in Figure 2 depicts the input of a zip code "4431," an



extraction code for the street name "Hell," as well as the house number "8." Display forms other than a divided display can be used as well. This input information is used to identify matching entries in the address directory 134. A complete evaluation of the address information of the respective image basically has occurred if a clear coordination  
5 between the input information and an entry to the address directory 134 was found. However, such an unambiguous coordination cannot be achieved for a certain percentage of entries because a number of different address entries correspond to the coded address information.

According to Figure 3, a decision 300 is made to decide whether the address  
10 information of an image was evaluated completely during the video coding. If the decision is positive (Yes), then the respective item can be provided either with a bar code if the delay time was sufficient to carry out an on-line video coding, or a corresponding linking takes place between the TID and a bar coding, based thereon. In any case, the respective item can be sorted further with standard means. In case of a negative decision  
15 (No), the invention provides for another automatic evaluation by using the results of the video coding, meaning that for this further automatic evaluation, the information obtained through video coding is available to the OCR processor in addition to the information shown on the image. In the above example, this is the triple information "4432," "Hell," "8." In Figure 3, this is expressed symbolically by the content of circle 310. This is  
20 followed by a decision 320 on whether a complete evaluation of the respective image has taken place. In the positive case (Yes), the respective information is used for the further sorting of the item, in the same way as following a positive decision at decision point

300. If the decision is negative (No), another video coding takes place using the results the additional automatic evaluation. In this case, the operator is preferably presented with a number of alternatives to be selected, from which a selection must be made.

It is preferable if the last two stages of the method, namely the additional automatic evaluation as well as the additional video coding, do not take place on-line, but off-line because the available delay time is too short for an on-line implementation.

5 The method according to the invention thus contains three phases that act in combination. These are:

1. The phase for data input through video coding, where a coding of certain parts of the address information takes place, preferably with a simple extraction code. During this process, the zip/pc information as well as a larger portion of the additional address information is normally evaluated completely or the locality  
10 names are extracted if the zip/pc is missing. A first automatic evaluation of the address information already preceded this phase.

The input is preferably with a divided display. In order to simplify the input, a simple extraction code is used, e.g. a 4-digit postal code, the first four alpha  
15 characters of the street name and the digits for the house numbers of the respective addresses. With this extraction coding, an adaptation to the respective postal conventions is possible without problems. For example, the number of first letters can be varied. Preferably, the operator will input the postal code only if the OCR evaluation did not show any result at all. Thus, the input of street  
20 information will apply to most of the postal goods. A structuring of the video coding preferably can also occur in that one group of operators enters the postal code and street information while another group enters street information only. Since a specific percentage of the mail nowadays contains post office box

information, a suitable key space on the keyboard should preferably be assigned as post office box key, which can be depressed by the operator if necessary.

Following this, the post office box number is entered. With company addresses, which lack street data or post office box data, it is also possible to enter the company line.

2. A further automatic evaluation uses information that was entered during the previous phase with the aid of video coding. The additional information increases the probability of a complete evaluation during the further automatic evaluation.

An additional automatic evaluation takes place if the address information was not evaluated completely during the preceding phase. If an extraction code is used, two or more entries exist in the address directory for this. With a suitable extraction coding, only two address entries exist for more than 90% of the cases.

3. Additional video coding of those images, which could not be evaluated completely during the previous phases. Images of the non-evaluated addresses are preferably presented to the operator, together with the results from the preceding video coding and the automatic evaluation of the second phase two. The operator must then preferably select only one option from the predetermined alternatives.

Additional context information is subsequently available for further automatic evaluation. That is to say, the number of address entries to be considered is limited by the number of candidates obtained through the extraction coding. It

can be assumed that the correct address is among these candidates. The house number is normally also known.

The further video coding of such address information, which was not evaluated completely during the preceding phases, is preferably used to process unclear results of the extraction coding or additional sorting-relevant information on the addressee line. The operator is preferably presented with successive images of the item surface, wherein the evaluation options of the address or the addressee are shown in one window. The options can be selected either through keyboard input of a selection number or via a mouse or voice processor.

One preferred embodiment of the invention provides for an evaluation of a first component of the address information and an evaluation of a second component of the address information as well as a check of the evaluation results with respect to mutual consistency. The first component of the address information in particular can be the zip or postal code, the second component can be a street or a house number. Inconsistencies between both components may be due, for example, to reading errors or an incorrect listing of the zip or postal code. In case of a wrong information, a number of alternatives for the street name are obtained, starting with the first three or four digits of the zip or postal code. The operator performs an extraction coding of the second component of the address information, which also results in a number of suggestions for the street name. During the consistency check, only those suggestions are not rejected, for which the results of these two analyses are mutually compatible.

In the following, the aforementioned embodiment is explained in further detail with the aid of two examples. On one item, the address is listed as:

Bucklestr. 5

D-78457 Konstanz

5 in place of the correct address:

Bücklestr. 5

D-78467 Konstanz

10 In that case, "78457 Buck 5" is used to obtain the entry "Buckley 5, Konstanz" from a street directory during an extraction coding. This is a correct association of the incorrect zip code 78457. During the consistency check, the inconsistency of "Bucklestr." and "Buckley" is detected through automatic evaluation and the respective evaluation result is rejected. On the other hand, if the address line with zip code and location information is read with a high error rate OCR, whereas the street information is read with a low error rate, the operator only enters the zip code or a number of letters from the location  
15 information. It is preferable in this case if the OCR result with low error rate is given preference over the operator input.

In another preferred embodiment of the invention, the information affixed to the surfaces of goods is evaluated through video coding in those cases where an automatic evaluation was not successful because the address information and the addressee  
20 information could not be differentiated by the automatic evaluation device. In particular, this occurs with mail goods where the addressee information is affixed immediately above or below the address information, e.g. with mail from Denmark. Since the item

surface is displayed for the operator during the video coding, it is normally easy to identify the respective information as address information or sender information and, if necessary, to perform an extraction coding.

Patent Claims

1. A method for processing goods with an automatic address reading system,  
wherein for each item an image of the surface containing the address information  
is obtained for each item and is supplied to an OCR unit for the automatic  
evaluation device and, if the address information is not recognized  
unambiguously, the associated image is transmitted further to a video-coding  
station for video coding,  
  
**characterized in that** the image of each address information that is not  
unambiguously recognized within a specific time interval by means of video  
coding is transmitted along with the information on recognized address  
components, obtained during the video coding, to the OCR unit for further  
automatic evaluation for an address interpretation.
2. A method according to claim 1, characterized in that the image of each address  
information that is not unambiguously recognized during the further automatic  
OCR evaluation for the address interpretation is transmitted along with the  
obtained information to a video-coding station.
3. A method according to claim 1 or 2, characterized in that an extraction coding is  
carried out according to the extraction rules during the first video coding.
4. A method according to claim 2, characterized in that a selection coding takes  
place during the additional video coding, in such a way that a selection is made  
from a number of alternative evaluation results.



5. A method according to claim 4, characterized in that the alternative evaluation results are formed from the unclear results of the extraction coding.
6. A method according to claim 5, characterized in that alternative evaluation results are formed from address information, which contains additional sorting information.
7. A method according to one of the claims 1 to 6, characterized in that a first component of the address information is evaluated and that a second component of the address information is evaluated and that the results of these evaluations are checked with respect to mutual consistency.
8. A method according to claim 7, characterized in that the image of any address information, which has not been recognized unambiguously within a specific time interval by means of video coding is transmitted along with the information on recognized address components, obtained during the video coding, to the OCR unit for a further automatic evaluation.
9. A method according to claim 1 to 8, characterized in that the first automatic evaluation of the address information is performed on-line or off-line.
10. A method according to claim 1 to 9, characterized in that the goods, for which no complete, additional automatic on-line evaluation or an evaluation through video coding of the address information has taken place, are provided with an identification marking (TID) for an additional automatic or video coding, to be performed off-line.

11. A method according to claim 1 to 9, characterized in that a preview coding method is used, at least for one of the video coding processes.
12. A method according to claim 1 to 11, characterized in that a differentiation between address information and sender information is made for the video coding.
13. A device for carrying out the method according to claim 1 to 12, comprising an automatic address reading system which has
  - a device for obtaining the images of the goods (120),
  - an OCR processor (130) for the automatic evaluation of address information containing images of the item surfaces,
  - a device for video coding the images of item surfaces, containing the address information, by using at least one video-coding station (200);
  - an image controller (170) for controlling the data flow between the OCR processor (130) and the device for video coding, characterized in that the image controller (170) is designed such that the image of any complete address information, which is not recognized unambiguously within a specific time interval, is transmitted along with the information on address components, obtained through the video coding, to the OCR processor (130) for a further automatic evaluation of the address interpretation.
14. A device according to claim 13, characterized in that a device is provided for affixing identification information (TID) to goods where the address information has not been evaluated completely on-line.

**Abstract**

**Method for Processing Postal Goods**

With a method for processing goods in an automatic reading system, for which an image of the address-containing surface of each item is obtained and transmitted to a first automatic evaluation and, in case of an incomplete evaluation of the address information, is transmitted to a first video coding for evaluation, it is provided that the address information of those images, which are not completely evaluated during the video coding, are transmitted to a further automatic evaluation by making use of the results of the video coding.

**Figure 1**

02/99

DECLARATION FOR UNITED STATES PATENT APPLICATION,  
POWER OF ATTORNEY, DESIGNATION OF CORRESPONDENCE ADDRESSAttorney Docket  
SIMNS 4355.01

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and that I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled Method of Processing Postal Matters, the specification of which

[ ] is attached hereto.

[ ] was filed on \_\_\_\_\_ as Application No. \_\_\_\_\_ and was amended on \_\_\_\_\_ if applicable].

[x] was filed under the Patent Cooperation Treaty on April 26, 1997 Serial No. PCT/EP97/02167, the United States of America being designated.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent, utility model, design or inventor's certificate listed below and have also identified below any foreign application(s) for patent, utility model, design or inventor's certificate having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
Number	Country	Date Filed	Yes	No
196 24 977.5	Germany	June 22, 1996	X	

I hereby appoint the following attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: George H. Spencer (Reg. No. 18,038), Norman N. Kunitz (Reg. No. 20,586), Robert J. Frank (Reg. No. 19,112), Gabor J. Kelemen (Reg. No. 21,016), Robert Kinberg (Reg. No. 26,924), John W. Schneller (Reg. No. 26,031), Ashley J. Wells (Reg. No. 29,847), Allen Wood (Reg. No. 28,134), James R. Burdett (Reg. No. 31,594) Suite 1000, 1201 New York Avenue, N.W., Washington, D.C. 20005-3917, Telephone: (202) 962-4800, Telefax: (202) 962-8300.

Address all correspondence to VENABLE, P.O. Box 34385, Washington, D.C. 20043-9998.

The undersigned hereby authorizes the U.S. attorneys named herein to accept and follow instructions from the undersigned's assignee, if any, and/or, if the undersigned is not a resident of the United States, the undersigned's domestic attorney, patent attorney or patent agent, as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and the undersigned. In the event of a change in the person(s) from whom instructions may be taken, the U.S. attorneys named herein will be so notified by the undersigned.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under ?1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signature: Karl-Günther HANSEL Date: March 22, 1999.  
First Joint Inventor: Karl-Günther HANSEL  
Citizenship: German  
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Signature: Walter Rosenbaum Date: March 23, 1999.  
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